The Influence of Augmented Reality (AR)-Based Learning Media in Physics Learning: A Systematic Literature Review

Irnin Agustina Dwi Astuti[1,4]*, Basuki Wibawa[2], and Eveline Siregar[3]

[1,2,3] State University of Jakarta, DKI Jakarta, Indonesia
[4]Indraprasta PGRI University, DKI Jakarta, Indonesia
*irnin.agustina@gmail.com[1,4], bwibawa@unj.ac.id[2], esiregar@unj.ac.id[3]

Abstract. Learning media facilitates learners in the learning process, enabling them to construct their understanding of the material being studied during the learning process. This study aims to determine the effect of Augmented Reality (AR)-based learning media in physics education. The research utilized the Systematic Literature Review (SLR) method. Data was collected by documenting and reviewing journal articles related to the impact of Augmented Reality (AR) learning media published between 2010 to 2023. A total of 30 articles obtained from Google Scholar were used in this study. Based on the findings of this research, it was found that the influence of Augmented Reality (AR) learning media can stimulate learners' thinking patterns, help students understand physics concepts, motivate students to learn, and solve physics problems.

Keywords: Augmented Reality (AR); physics learning media; systematic literature review; solve physics problem;

1 Introduction

Technological developments that enter the era of the industrial revolution 4.0 make the need for technology an inseparable unity. Education in the 4.0 age is one way to use the phenomenon of digitalization in everyday life, whereas, in education 4.0, there is an interaction between humans and machines in solving problems and finding innovations [1, 2].

Utilizing information and communication technologies seeks to improve learning's efficacy and efficiency. Technology in education has shifted the delivery of material with the lecture method towards interactive learning media. Learning media previously in print media has changed into audio-visual media displayed through the internet network that can be accessed online [3, 4].

Augmented Reality (AR) technology is one application of technology in education. Augmented Reality (AR) technology projects virtual objects in real time by combining two- and three-dimensional virtual objects into a natural three-dimensional envi-

M. Salimi et al. (eds.), *Proceedings of the 7th International Conference on Learning Innovation and Quality Education (ICLIQE 2023)*, Advances in Social Science, Education and Humanities Research 873,
https://doi.org/10.2991/978-2-38476-301-6_75

ronment [5]. AR just enhances or adds to facts, as opposed to virtual reality, which totally replaces reality. AR technology, as one of the learning media, can stimulate students' critical thinking skills toward problems and events that exist in everyday life [6]. AR can provide direct learning wherever and whenever students want to carry out the learning process. AR learning media can help students visualize abstract learning concepts [7, 8].

One of the contextual and seemingly abstract learning is physics learning. One of the subjects that students find most challenging is physics. Many students need help learning physics material caused of contextual and abstract knowledge. Some concepts in physics, such as the laws of motion, force, electricity, and magnetism, require a deep understanding and strong application of mathematics.

Therefore, innovation needs in physics learning. One of them is by using Augmented Reality learning media. With AR, students may visualise physics topics in the real environment. They can observe and manipulate virtual objects related to physics concepts, thus facilitating understanding of abstract concepts [9]. With AR, students can perform interactive physics simulations that allow them to see and observe physical phenomena that are difficult to repeat in a classroom environment [10, 11]. The aim of this research is to examine the influence of Augmented Reality-based learning media in physics education. This study is based on references from several relevant international journals related to this research.

2 Method

This study employed the Systematic Literature Review (SLR) technique. This research methodology identifies, examines, assesses, and interprets all existing research [12]. The goal of the descriptive analysis method is to provide a word or sentence that succinctly, thoroughly, and methodically describes the data. The explanation presented in this paper is based on the analysis of literature studies relevant to the topic discussed. The consideration of literature selection is based on two criteria, namely the relationship with the issue concerned and based on the content and content of the literature, whether it can believe its validity and credibility. Researchers can use this strategy to methodically review and identify journals that adhere to the procedures outlined in each process. [13].

The PRISMA model follows four steps throughout the data collecting and reduction stage; Recognition, vetting, qualification, and incorporation [14]. First, a search was conducted through Google Scholar with the keyword "Augmented Reality in physics learning" in the range of 2010 - 2023. Of the 64 articles obtained, the articles were re-selected based on "physics" and "AR media," after which they were re-filtered by category: research articles and international publications. Figure 1 shows the process of selecting articles in stages following the PRISMA model.

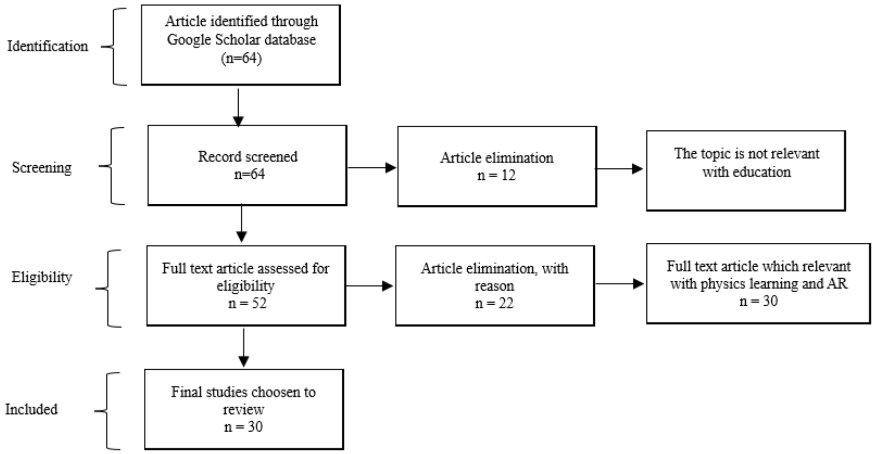

Fig. 1. PRISMA Model for reduction articles.

Based on the PRISMA model analysis, used 30 journal articles or international proceedings in this research were obtained from Google Scholar. The selected articles had similar research topics that were analyzed and summarized. The research findings were then incorporated into a comprehensive discussion in this article.

3 Results and Discussion

Based on the literature review from several international journals conducted to find the relationship between physics learning activities conducted with AR (Augmented Reality) learning media and the impact that occurs when using AR, it can show in Table 1.

Table 1. Learning activity and the result of AR implementation.

No	Article Identity	Learning Activity	Result
1	V V Osadchyi, N V Valko & L V Kuzmich (2021) [15]	STEM	STEM learning using AR can enhance students' understanding of concepts
2	Christina Volioti, Euclid Keramopoulos, Theodosios Sapounidis, Konstantinos Melisidis, Maria Zafeiropoulou, Charalampos Sotiriou & Vladimiros Spiridis (2022) [16]	Physics Experiment	AR can enhance students' learning experience in conducting experiments, fostering creative thinking, and developing students' psychomotor skills in the classroom
3	Michael Thees, Sebastian Kapp, Martin P. Strzys, Fabian Beil, Paul	Physics Experiment	AR can enhance students' scientific process skills and engagement in

No	Article Identity	Learning Activity	Result
	Lukowicz, & Jochen Kuhn (2020) [17]		learning in the laboratory
4	Tai Fook Lim Jerry & Cheng Chi En Aaron (2010) [18]	Inquiry-based Learning	The result showed that the AR intervention positively affected students' academic achievement.
5	Maria Zafeiropoulou, Christina Volioti, Euclid Keramopoulos & Theodosios Sapounidis (2021) [19]	Game-based Learning	Combining AR with game-based learning can enhance students' learning motivation and engagement. Additionally, it also improves students' technology literacy and proficiency.
6	Roman Gurevych, Anatolii Silveistr, Mykola Mokliuk, Iryna Shaposhnikova, Galyna Gordiichuk, Svitlana Saiapina, (2021) [20]	Traditional method	Students are learning motivation and engagement. Additionally, it also improves students' technology literacy and proficiency.
7	H V Saphira, I A Rizki, Y Alfarizy, A D Saputri, R Ramadani, & N Suprapto (2022) [21]	PBL	AR in physics education can enhance students' critical thinking skills in physics.
8	Doni Ropawandi, Lilia Halim, & Hazrati Husnin (2022) [22]	PBL	AR can enhance students' understanding of abstract physics concepts and help them solve physics problems
9	Aisyah, N. Bukit, & Derlina (2020) [23]	Blended learning	AR can improve students' learning outcomes and motivation while increasing student engagement in classroom activities.
10	Harun Faridi, Neha Tuli, Archana Mantri, Gurjinder Singh, & Shubham Gargrish, (2020) [24]	Traditional method	The AR experience helps students visualize abstract physics concepts and enhances their understanding/

Based on Table 1, it was discovered that by establishing a supportive learning environment, learning activities utilizing the Inquiry Learning model can increase learning outcomes and inspire students to study. When augmented reality (AR) was combined with the problem-based learning model, similar findings were seen. AR has the potential to improve students' learning outcomes and physics critical thinking abilities. Including augmented reality (AR) into lab tasks can also help to strengthen critical thinking abilities. AR in physics experiments can visualize physics concepts, enhancing students' creative thinking abilities. AR can also be combined with game-based learning, making physics learning more engaging. However, other results show that using AR with traditional learning only impacts students' motivation to learn and their positive attitudes.

The research variables will undoubtedly be impacted by the type of AR produced that need to be measured. The AR media used in physics education varies in explaining physics concepts. The types of AR and the physics concepts commonly used in AR media can see in Table 2.

Table 2. Topic and kind of AR in physics development.

No	Article Identity	Topic	Kind of AR
1	Mustafa Serkan Abdusselam & Hasan Karal (2020) [25]	Magnetism	3D object
2	Corey Pittman & Joseph J. LaViola Jr. (2020) [26]	Electricity	3D animation
3	Rifqa Gusmida & Nur Islami (2017) [27]	Kinetic Theory of Gases	3D animation
4	Tai Fook Lim Jerry & Cheng Chi En Aaron (2010) [18]	Kinematics	3D object and video
5	F Bakri, H P Kencana, H Permana & D Muliyati (2019) [28]	Radiation	3D object
6	A H Permana, D Muliyati, F Bakri, B P Dewi & D Ambarwulan (2018) [29]	Electricity	3D animation
7	Juliana Aida Abu Bakar, Valarmathie Gopalan, Abdul Nasir Zulkifli, & Asmidah Alwi (2018) [30]	Magnetism	3D object
8	A Ismail, G Rahayu, M A K Putera, N N Aghniya & S Gumilar (2021) [31]	Electricity	3D video
9	A Ismail, S Gumilar, I F Amalia, D D Bhakti & I Nugraha (2021) [32]	Electricity	3D object.
10	Zainuddin, A R Hasanah, M A Salam, Misbah, & S Mahtari (2019) [33]	Kinetic Theory of Gases	3D animation
11	Andreas Dünser, Lawrence Walker, Heather Horner, & Daniel Bentall [34]	Magnetism	3D animation
12	H P Kencana, B H Iswanto & F C Wibowo (2021) [35]	Magnetism	3D object

Table 2 shows that the most commonly used types of AR in physics education are 3D objects, 3D videos, and 3D animations. These three types of AR displays involve 3D representations. AR content can be 3D models, animations, data visualizations, or interactive virtual objects that can experience using AR devices. The specific types of AR created are tailored to the physics topics to provide relevant visualizations that are easily understandable by students.

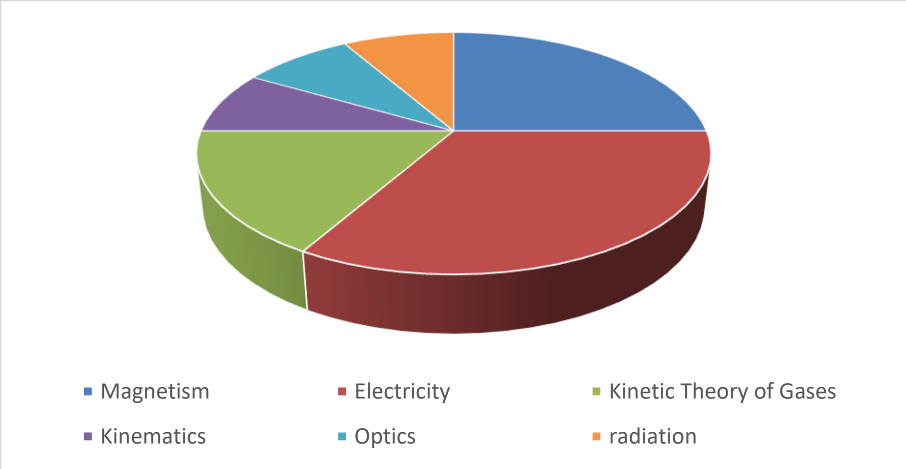

Fig. 2. Trends of research topic in physics with AR.

Based on Fig 2, it can be seen that the physics topic most commonly used based on the trend of AR research is electricity (33.33%). Electricity is widely utilized in AR media because it allows for the visualization of electrical concepts, particularly in static electricity, which is highly abstract. With the help of AR, the visualization of electricity concepts becomes clear. The other physics topics frequently implemented with AR are magnetic (25%), kinetic theory of gases (16.67%), kinematics, optics, and radiation (8.33%).

The concepts of magnetic and electric have abstract properties that are difficult to understand directly. In simulations, these concepts can represent visually and interactively, allowing students to see and experience the phenomenon in a more tangible way. Some hands-on experiments in magnetic and electrical fields may be difficult or dangerous in a classroom. Students can access and run experiments safely and without physical restrictions with simulations. Concepts in magnetic and electricity often involve interactions between magnetic and electric fields with objects or particles. Simulations allow students to see these interactions in real time and explore variations in different situations [36, 37]. Simulations can provide powerful visual representations of magnetic and electrical concepts. It helps students understand concepts better and relate theories to natural phenomena.

The application of augmented reality (AR) in physics education offers a fresh perspective on how to teach in classrooms, making them more technologically savvy and giving students more opportunity to study. in their introduction to technology [38]. Additionally, AR can be used not only inside the classroom but also outside of it, allowing students to directly learn physics with AR and integrate it with the environment.

Using smartphones and Augmented Reality technology in physics learning can also increase student learning independence [39, 40]. It will improve the quality of education. However, teachers still accompany students as facilitators and strive to keep learning two-way so that the interaction between students and professors is mutual.

One that influences students in learning is the use of media. Good media can change and improve students. Media that is currently developing by the development of the digital world is multimedia [41]. Multimedia combines text, graphics, images, photos, animations, audio, and video. Multimedia learning tools come in a variety of formats, including text, visual, audio, and movement, in addition to spoken language [42]. AR is part of digital multimedia in 3D. Learning media as teaching aids support teaching methods teachers use in the learning process [43].

AR is suitable for physics learning because it can visualize abstract concepts. In line with Kapp's research, AR can explain macroscopic material [44]. AR can also simulate the interactions of subatomic particles on a quantum scale. By utilizing AR technology, it can affect a three-dimensional view of the particle wave function or map the energy of particles in a specific potential [45].

4 Conclusion

Based on the results of research and discussion, Augmented Reality (AR) learning media can stimulate the mindset of students by helping students understand physics concepts, motivate student learning, and be able to solve physics problems. AR can use as a support for physics learning combined with specific learning models. The most widely used types of AR in physics learning are 3D objects, 3D video, and 3D animation. Many physical materials made with AR are electricity, magnetic, kinetic theory of gas, kinematics, optics, and radiation.

References

1. 1. Sima, V., Gheorghe, I.G., Subić, J., Nancu, D.: Influences of the industry 4.0 revolution on the human capital development and consumer behavior: A systematic review. Sustainability. 12, 4035 (2020).
2. 2. Halili, S.H., Zainuddin, Z.: TECHNOLOGICAL ADVANCEMENTS IN EDUCATION 4.0. 7, 197–206 (2019).
3. 3. Azizah, S.N., Nandiyanto, A.B.D., Wulandary, V., Irawan, A.R.: Implementation of video learning media in Islamic Religious Education subjects for Elementary School Students. Indones. J. Multidiciplinary Res. 2, 91–96 (2022).
4. 4. Oyedele, V., Rwambiwa, J., Mamvuto, A.: Using Educational Media And Technology2 In Teaching And Learning Processes: A Case Of Trainee Teachers At Africa University. Acad. Res. Int. 4, 292 (2013).
5. 5. Wulandari, S., Wibowo, F.C., Astra, I.M.: A review of research on the use of augmented reality in physics learning. In: Journal of Physics: Conference Series (2021). https://doi.org/10.1088/1742-6596/2019/1/012058.
6. 6. Elmunsyah, H., Suswanto, H., Hakiki, M.A., Hidayat, W.N., Asfani, K.: Development of Mobile Learning Applications with Augmented Reality to Build VHS Students' Critical Thinking. In: 2022 Fifth International Conference on Vocational Education and Electrical Engineering (ICVEE). pp. 190–195. IEEE (2022).
7. 7. Adzandini, V.N.: Augmented Reality as a 21st Century History Education Media. In: International Seminar on Social Studies and History Education. pp. 591–599 (2022).

8. 8. Haryadi, R., Pujiastuti, H.: Enhancing Pre-service Physics Teachers' Higher-Order Thinking Skills Through STEM-PjBL Model. Int. J. STEM Educ. Sustain. 2, 156–171 (2022).
9. 9. Lai, J.W., Cheong, K.H.: Educational Opportunities and Challenges in Augmented Reality: Featuring Implementations in Physics Education. IEEE Access. 10, 43143–43158 (2022). https://doi.org/10.1109/ACCESS.2022.3166478.
10. 10. Sung, N.J., Ma, J., Choi, Y.J., Hong, M.: Real-time augmented reality physics simulator for education. Appl. Sci. 9, 1–12 (2019). https://doi.org/10.3390/app9194019.
11. 11. Putri, C.R., Soleh, S.M., Saregar, A., Anugrah, A., Susilowati, N.E.: Bibliometric analysis: Augmented reality-based physics laboratory with VOSviewer software. In: IOP Conference Series: Earth and Environmental Science (2021). https://doi.org/10.1088/1742-6596/1796/1/012056.
12. 12. Winarti, W., Sulisworo, D., Kaliappen, N.: Evaluation of STEM-Based Physics Learning on Students' Critical Thinking Skills: A Systematic Literature Review. Indones. Rev. Phys. 4, (2021). https://doi.org/https://doi.org/10.12928/irip.v4i2.3814.
13. 13. Awuor, F.M., Okono, E.: ICT Integration in Learning of Physics in Secondary Schools in Kenya: Systematic Literature Review. Open J. Soc. Sci. 10, 421–461 (2022). https://doi.org/10.4236/jss.2022.109027.
14. 14. Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., Altman, D., Antes, G., Atkins, D., Barbour, V., Barrowman, N., Berlin, J.A.: Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement (Chinese edition). J. Chinese Integr. Med. 7, 889–896 (2009).
15. 15. Osadchyi, V. V., Valko, N. V., Kuzmich, L. V.: Using augmented reality technologies for STEM education organization. In: Journal of Physics: Conference Series (2021). https://doi.org/10.1088/1742-6596/1840/1/012027.
16. 16. Volioti, C., Keramopoulos, E., Sapounidis, T., Melisidis, K., Zafeiropoulou, M., Sotiriou, C., Spiridis, V.: Using Augmented Reality in K-12 Education: An Indicative Platform for Teaching Physics. Inf. 13, (2022). https://doi.org/10.3390/info13070336.
17. 17. Thees, M., Kapp, S., Strzys, M.P., Beil, F., Lukowicz, P., Kuhn, J.: Effects of augmented reality on learning and cognitive load in university physics laboratory courses. Comput. Human Behav. 108, 106316 (2020). https://doi.org/10.1016/j.chb.2020.106316.
18. 18. Jerry, T.F.L., Aaron, C.C.E.: The impact of Augmented Reality software with inquiry-based learning on students' learning of Kinematics graph. In: ICETC 2010 - 2010 2nd International Conference on Education Technology and Computer. pp. 1–5 (2010). https://doi.org/10.1109/ICETC.2010.5529447.
19. 19. Zafeiropoulou, M., Volioti, C., Keramopoulos, E., Sapounidis, T.: Game-Based Learning Approach : A Pilot Study in Primary. Computers. 10, 1–14 (2021).
20. 20. GUREVYCH, R., SILVEISTR, A., MOKLIUK, M., SHAPOSHNIKOVA, I., GORDIICHUK, G., SAIAPINA, S.: Using Augmented Reality Technology in Higher Education Institutions. Postmod. Openings. 12, 109–132 (2021). https://doi.org/10.18662/po/12.2/299.
21. 21. Saphira, H. V., Rizki, I.A., Alfarizy, Y., Saputri, A.D., Ramadani, R., Suprapto, N.: Profile of Students' Critical Thinking Skills in Physics Learning: A Preliminary Study of Games Application Integrated Augmented Reality. In: Journal of Physics: Conference Series (2022). https://doi.org/10.1088/1742-6596/2377/1/012088.
22. 22. Ropawandi, D., Halim, L., Husnin, H.: Augmented Reality (AR) Technology-Based Learning: The Effect on Physics Learning during the COVID-19 Pandemic. Int. J. Inf. Educ. Technol. 12, 132–140 (2022). https://doi.org/10.18178/ijiet.2022.12.2.1596.

23. 23. Aisyah, Bukit, N., Derlina: Blended learning on physics using augmented reality. In: Journal of Physics: Conference Series (2020). https://doi.org/10.1088/1742-6596/1485/1/012004.
24. 24. Faridi, H., Tuli, N., Mantri, A., Singh, G., Gargrish, S.: A framework utilizing augmented reality to improve critical thinking ability and learning gain of the students in Physics. Comput. Appl. Eng. Educ. 29, 258–273 (2021). https://doi.org/10.1002/cae.22342.
25. 25. Abdusselam, M.S., Karal, H.: The effect of using augmented reality and sensing technology to teach magnetism in high school physics. Technol. Pedagog. Educ. 29, 407–424 (2020). https://doi.org/10.1080/1475939X.2020.1766550.
26. 26. Pittman, C., Jr, J.J.L.V.: PhyAR: Determining the Utility of Augmented Reality for Physics Education in the Classroom. In: Proceedings - 2020 IEEE Conference on Virtual Reality and 3D User Interfaces, VRW 2020. pp. 761–762 (2020). https://doi.org/10.1109/VRW50115.2020.00231.
27. 27. Gusmida, R., Islami, N.: The Development of Learning Media for the Kinetic Theory of Gases Using the ADDIE Model with Augmented Reality. J. Educ. Sci. 1, 1 (2017). https://doi.org/10.31258/jes.1.1.p.1-10.
28. 28. Bakri, F., Kencana, H.P., Permana, H., Muliyati, D.: The 3-D animation of radiation concept using augmented reality technology. In: Journal of Physics: Conference Series. pp. 3–7 (2019). https://doi.org/10.1088/1742-6596/1402/6/066077.
29. 29. Permana, A.H., Muliyati, D., Bakri, F., Dewi, B.P., Ambarwulan, D.: The development of an electricity book based on augmented reality technologies. In: Journal of Physics: Conference Series (2019). https://doi.org/10.1088/1742-6596/1157/3/032027.
30. 30. Bakar, J.A.A.B., Gopalan, V., Zulkifli, A.N., Alwi, A.: Design and Development of Mobile Augmented Reality for Physics Experiment. In: in User Science and Engineering: 5th International Conference. pp. 47–58 (2018). https://doi.org/10.1007/978-981-13-1628-9.
31. 31. Ismail, A., Rahayu, G., Putera, M.A.K., Aghniya, N.N., Gumilar, S.: Development of augmented reality as physics learning media on electric concepts. In: IOP Conference Series: Materials Science and Engineering. p. 042006 (2021). https://doi.org/10.1088/1757-899x/1098/4/042006.
32. 32. Ismail, A., Gumilar, S., Amalia, I.F., Bhakti, D.D., Nugraha, I.: Physics learning media based Augmented Reality (AR) for electricity concepts. In: Journal of Physics: Conference Series (2019). https://doi.org/10.1088/1742-6596/1402/6/066035.
33. 33. Zainuddin, Hasanah, A.R., Salam, M.A., Misbah, Mahtari, S.: Developing the interactive multimedia in physics learning. In: Journal of Physics: Conference Series (2019). https://doi.org/10.1088/1742-6596/1171/1/012019.
34. 34. Dünser, A., Walker, L., Horner, H., Bentall, D.: Creating interactive physics education books with augmented reality. In: Proceedings of the 24th Australian Computer-Human Interaction Conference, OzCHI 2012. pp. 107–114 (2012). https://doi.org/10.1145/2414536.2414554.
35. 35. Kencana, H.P., Iswanto, B.H., Wibowo, F.C.: Augmented reality geometrical optics (AR-GiOs) for physics learning in high schools. In: Journal of Physics: Conference Series (2021). https://doi.org/10.1088/1742-6596/2019/1/012004.
36. 36. Ibáñez, M.-B., Di-Serio, Á., Villarán-Molina, D., Delgado-Kloos, C.: Augmented reality-based simulators as discovery learning tools: An empirical study. IEEE Trans. Educ. 58, 208–213 (2014).

37. 37. Irawati, S., Hong, S., Kim, J., Ko, H.: 3D edutainment environment: learning physics through VR/AR experiences. In: Proceedings of the 2008 International Conference on Advances in Computer Entertainment Technology. pp. 21–24 (2008).
38. 38. Yu, S., Liu, Q., Ma, J., Le, H., Ba, S.: Applying Augmented reality to enhance physics laboratory experience: does learning anxiety matter? Interact. Learn. Environ. 1–16 (2022).
39. 39. Rahmi, J., Wibawa, B., Khaerudin, K.: Mobile Augmented Reality (mAR) blended learning application in animal cells learning. In: IOP Conference Series: Materials Science and Engineering. p. 032097 (2021). https://doi.org/10.1088/1757-899x/1098/3/032097.
40. 40. Rasalingam, R.-R., Muniandy, B., Rass, R.: Exploring the application of Augmented Reality technology in early childhood classroom in Malaysia. J. Res. Method Educ. 4, 33–40 (2014).
41. 41. Kardipah, S., Wibawa, B.: A Flipped-Blended Learning Model with Augmented Problem Based Learning to Enhance Students' Computer Skills. TechTrends. 64, 507–513 (2020). https://doi.org/10.1007/s11528-020-00506-3.
42. 42. Ningrum, A.S., Muslim, S., Siregar, E.: Multimedia Simulation Model on Basic Electricial and Electronics Subjects for Vocational Secondary School. J. Educ. Res. Eval. 6, 72–79 (2022). https://doi.org/10.23887/jere.v6i1.38783.
43. 43. Lalian, O.N., Siregar, E., Winarsih, M.: The effects of using realia media on increasing science learning outcomes of elementary school students: A meta-analysis. In: ACM International Conference Proceeding Series. pp. 1–4 (2019). https://doi.org/10.1145/3323771.3323775.
44. 44. Kapp, S., Thees, M., Beil, F., Weatherby, T., Burde, J.-P., Wilhelm, T., Kuhn, J.: The Effects of Augmented Reality: A Comparative Study in an Undergraduate Physics Laboratory Course. In: CSEDU (2). pp. 197–206 (2020).
45. 45. Bakri, F., Permana, A., Chaeranti, S., Muliyati, D.: Module Equipped with Augmented Reality Technology: An Easy Way to Understand Concepts and Phenomena of Quantum. In: Proceedings of the 7th Mathematics, Science, and Computer Science Education International Seminar, MSCEIS 2019, 12 October 2019, Bandung, West Java, Indonesia (2020).